

ACCURATE CRYOGENIC LIQUID DISPENSER

ABSTRACT OF THE DISCLOSURE

A system for dispensing cryogenic liquid to a use device includes a bulk storage tank providing LNG to a sump containing a meter submerged in LNG. A temperature probe is also submerged in the LNG. A dispensing line is positioned between the meter and dispensing hose and includes a dispensing valve. A drain line bypasses the dispensing valve and features a check valve so that LNG trapped in the hose after dispensing is returned to the sump due to pressurization by ambient heat. A capacitance probe is submerged in the LNG in the sump and provides a dielectric that is compared by a microprocessor with the dielectric for pure methane at the same temperature to determine the purity of the LNG. An approximate linear relation between density and dielectric may be used to determine density and mass flow for the LNG from the measured dielectric. Alternatively, a density compensation factor based upon the dielectrics may be calculated and applied to the density of pure methane to obtain the density and mass flow of the LNG. A further alternative embodiment substitutes a compensating meter for the capacitor and the equations for the resulting two meters may be solved to determine density and mass flow for the LNG.